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Elements,

Parabolic, by M. Petersen, founded exclusively on his own observations of Feb. 28, March 2 and 4.

Perihelion Passage, 1846, Feb. 27, 4451, Berlin M.T.

Long. Perihelion	116° 25′ 12″	Appar. Equinox, March 2.
☊	96 21 32	
i	32 34 10	

Log. *q* 9·8094648. Motion direct.

These elements represent the middle observation pretty well.

Professor Schumacher remarks that these elements have a strong likeness with those of the comet observed in 1532, and calculated by Olbers; but if the comet be the same, it must have undergone a great alteration in light and magnitude. Olbers' elements, when brought down to 1846, are as follows:—

Long. Perihelion	116° 28′
☊	92 3
i	32 36

Log. *q* 9·71535. Motion direct.

There is also some likeness to the comet of 1661 (which was not so bright as the comet of 1532), but Mechain and Olbers both maintain these two to be different. The proofs of this opinion given by Mechain are not deemed quite satisfactory by Professor Schumacher, and he has not been able to get hold of Olbers' memoir.

Subsequent observations have shewn that the path of this comet cannot be represented by a parabola. The parabolic elements of Dr. Brunnow and M. d'Arrest, which were nearly identical with those of M. Petersen, were found to be so erroneous between March 4 and March 7, that these gentlemen investigated the elements without any assumption as to the nature of the conic section: the resulting *elliptic* elements are,

Perihelion Passage, 1846, Feb. 24·02410, Berlin M.T.

Perihelion	116° 11′ 57″·5	Mean Equinox, 1846.
☊	106 4 25·5	
i	29 29 30·8	
φ	45 26 9·2	

Log. *a* 0·357566. *μ* 1031″·95.

But Dr. Brunnow informed Mr. Hind that, in five days after the last observation employed, the errors of the predicted place from the elliptic elements amounted to 6″ in R.A. and 20″ in declination.

Mr. Hind has more recently computed the following elliptic elements from the Altona observation of Feb. 28, and the Berlin observations of March 4 and 10, duly corrected for parallax and aberration.

Perihelion Passage, 1846, Feb. 25, 33109, Greenwich M.T.

Long. of Perihelion on Orbit	116° 28′ 17″·8	Mean Equinox, 1846·0
Long. of Ascending Node	102 45 20·9	
Inclination	30 49 3·6	
Angle of Eccentricity	52 21 4·7	

Log. Semi-axis Major 0·4945602

Sidereal Period, 5·5187 years. Motion direct.

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Mr. Hind says, "The expressions for the comet's heliocentric co-ordinates referred to the apparent equator and equinox of 1846, March 15, are

$$\left.\begin{array}{l} x = [0{\cdot}2884070]\,.\,\sin(E + 221^\circ\ 37'\ 19''{\cdot}9) + 1{\cdot}0216821 \\ y = [0{\cdot}4270932]\,.\,\sin(E + 114\ \ 24\ \ 51{\cdot}5) - 1{\cdot}9275742 \\ z = [0{\cdot}1962723]\,.\,\sin(E + \ \ 69\ \ 18\ \ \ 7{\cdot}5) - 1{\cdot}1638461 \end{array}\right\}\ \text{E being the excentric anomaly.}$$

"For the calculation of the excentric anomaly we have

$$E - [5{\cdot}2130246]\,.\,\sin E = [2{\cdot}8081663]\,(t - \text{Feb. } 25{\cdot}33109)$$

where 2·8081663 is the logarithm of the mean diurnal motion.

"According to the Hamburg observation on March 15, the errors of the elements were + 2″ in right ascension, and in declination —4″: these differences are so very small that I hope the orbit will not be far from the truth, but it will undoubtedly require some correction to satisfy later observations.

"On March 25, M. Faye, of the Royal Observatory at Paris (then in possession of Brunnow's elements only), writes me as follows:—'These elements depend on an interval of seven days only; but they satisfy the later observations very well (up to March 16), and you may judge that the form of this orbit is of very decided ellipticity to manifest itself in so very short a lapse of time. I think, therefore, that these gentlemen are not very far from the truth, and that the comet of M. Brorsen ought to be included among those of short periods only. I am inclined to believe that the time of revolution (3·438 years) ought to be extended to about five years; for this reason:—the angle between the greater axis and the line of nodes being very small, this comet will not escape planetary perturbations, notwithstanding its great inclination. It appears to me probable that the orbit would extend to that of *Jupiter*, and that it would meet it between the line of nodes and the aphelion to the south of the ecliptic. Probably the circumstance to which the comet owes the actual form of its orbit may be of recent occurrence. If these conjectures are verified, the angle of excentricity will be increased; it would extend, doubtless, to 50°.'

"M. Faye's conjectures appear strongly supported by my ellipse, which depends on later observations than those employed by Dr. Brunnow and M. d'Arrest in their calculations, and the planet *Jupiter*, or, as M. Valz terms him, the 'tyrant of our system,' may have had the same influence on the elements of Brorsen's comet as he appears to have exercised at some past time on the comets of Faye and De Vico. Should this be the case, it is a strong argument in favour of the prosecution of a rigorous search for comets, as periodical ones may be far more numerous than is generally supposed, and their use in physical astronomy must be universally known. Brorsen's comet is now circumpolar, and those astronomers who are in the possession of powerful instruments will not fail to observe it as long as possible, that the next return to perihelion may be predicted with confidence and precision."

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